

2005

FUTURE COMBAT SYSTEMS



"Approved for Public Release, Distribution Unlimited, TACOM 26 Aug 2004, FCS Case 04-076"

Transforming the Army



“War is both a physical reality and a state of mind. War is ambiguous, uncertain, and unfair. When we are at war, we must think and act differently. We become more flexible and more adaptable.

We must anticipate the ultimate reality check – combat.”

{ General Peter J. Schoomaker, 35th CSA Arrival Message }

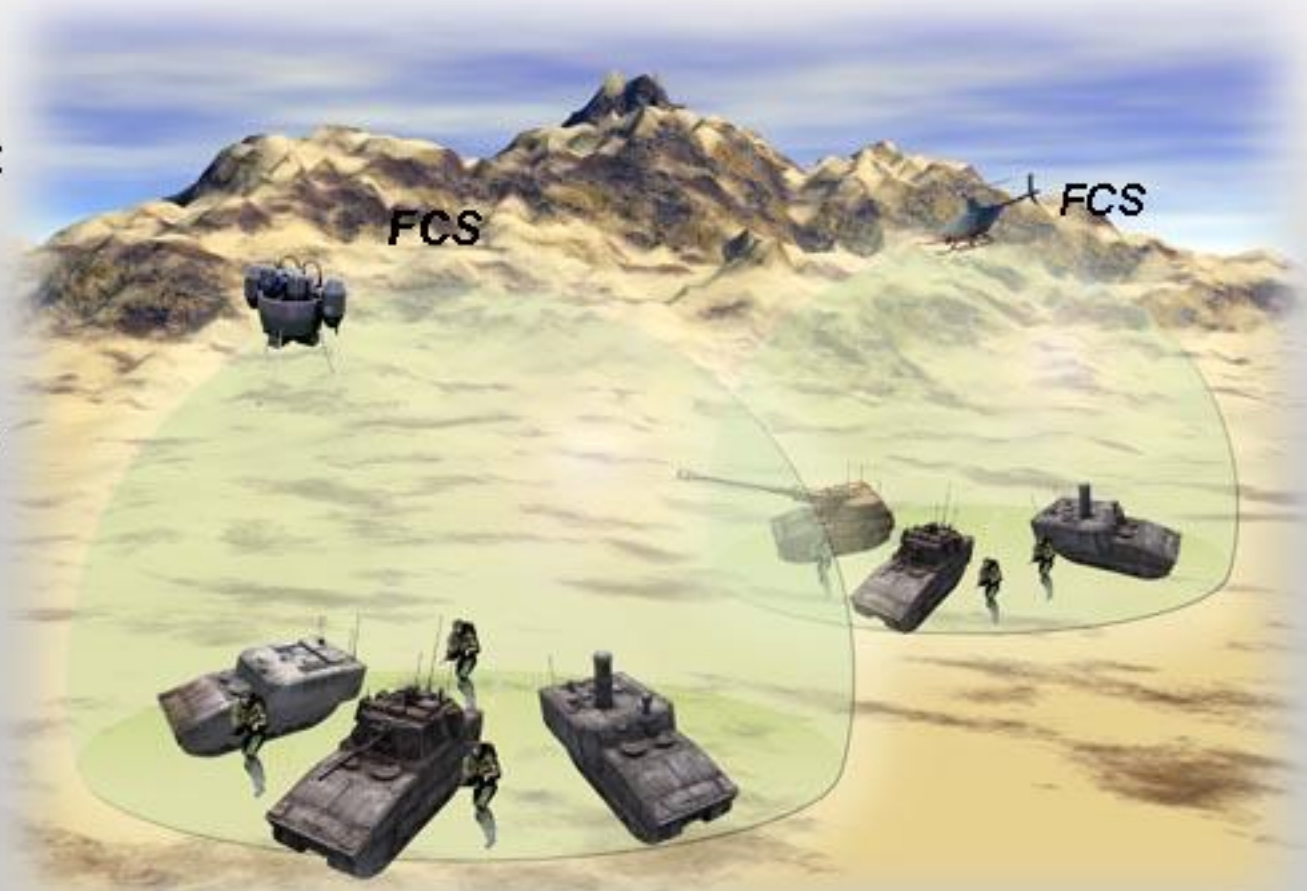
“... Army Transformation combines advanced technologies, organizations, people, and processes with concepts to create new sources of military power that are more *responsive, deployable, agile, versatile, lethal, survivable and sustainable*. We are also *transforming our institutions and business practices* to produce **these capabilities...”**

{ Army Transformation Roadmap, Executive Summary }

What is Future Combat Systems?

FUTURE COMBAT SYSTEMS
FCS
One Team - The Army/Defense/Industry

- **FCS is a highly integrated structure of manned and unmanned, air and ground assets, bound by a distributed network acting as a unified combat force in the Joint environment**
- **FCS has the full spectrum of combat capabilities and functions "built in"**
- **FCS is readily task organized / modular**
- **FCS is the building block of the Unit of Action (UA) and Future Force construct**



The Network

FUTURE COMBAT SYSTEMS
FCS
One Team - The Army/Defense/Industry

DISTRIBUTED / SELF CONFIGURING NETWORK / C4ISR BACKBONE

National
Assets

Joint /
Coalition Air

UA / UE / Joint /
Coalition Ground

Satellite Systems

Joint / Coalition
Nodes

Unmanned
Systems Nodes

Ground
Systems Nodes

Soldier
Systems Nodes

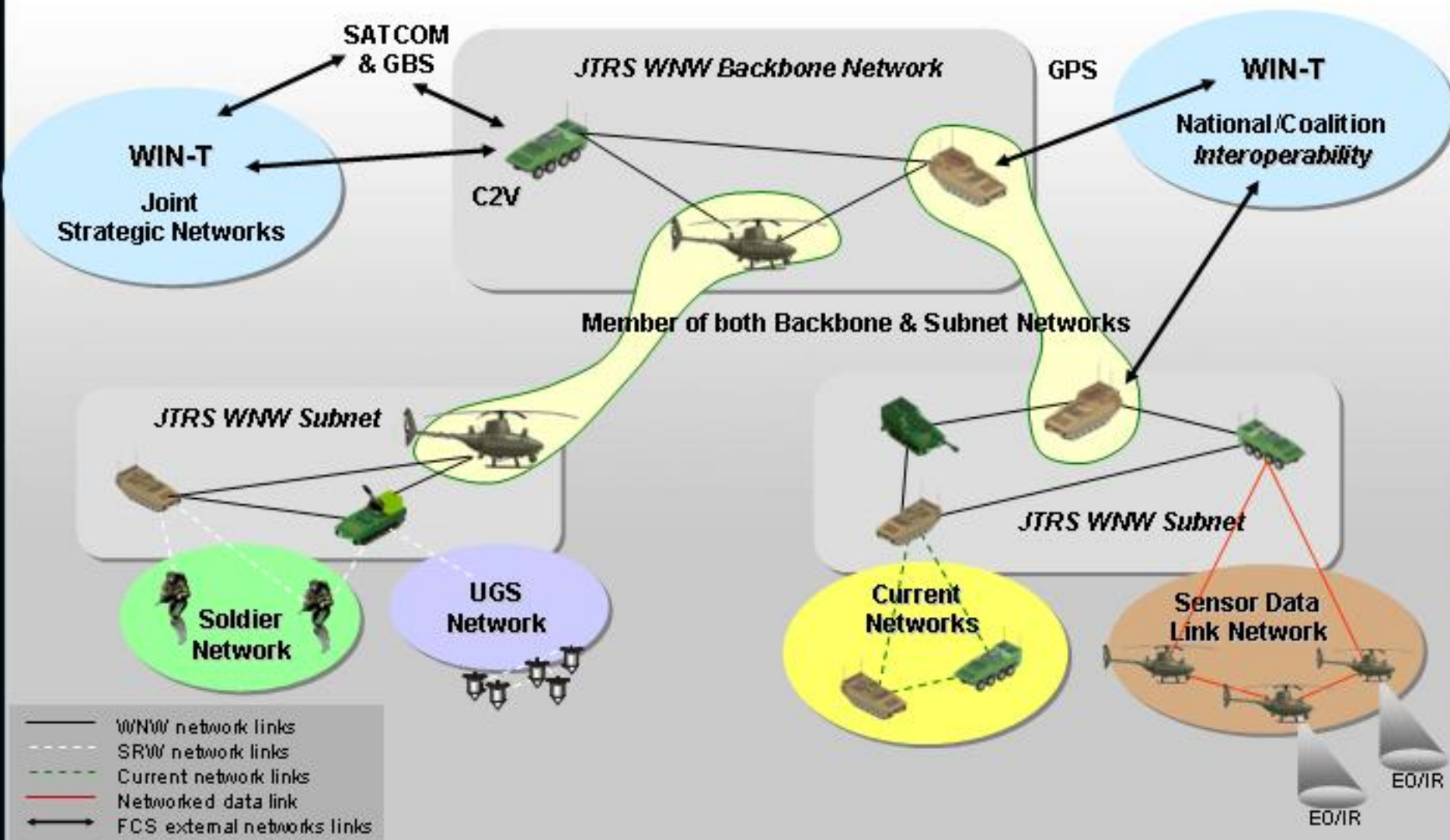
System of Systems Common Operating Environment (SoSCOE)

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Network Communications Architecture



How does the FCS-Equipped Unit of Action (UA) Fight Differently?

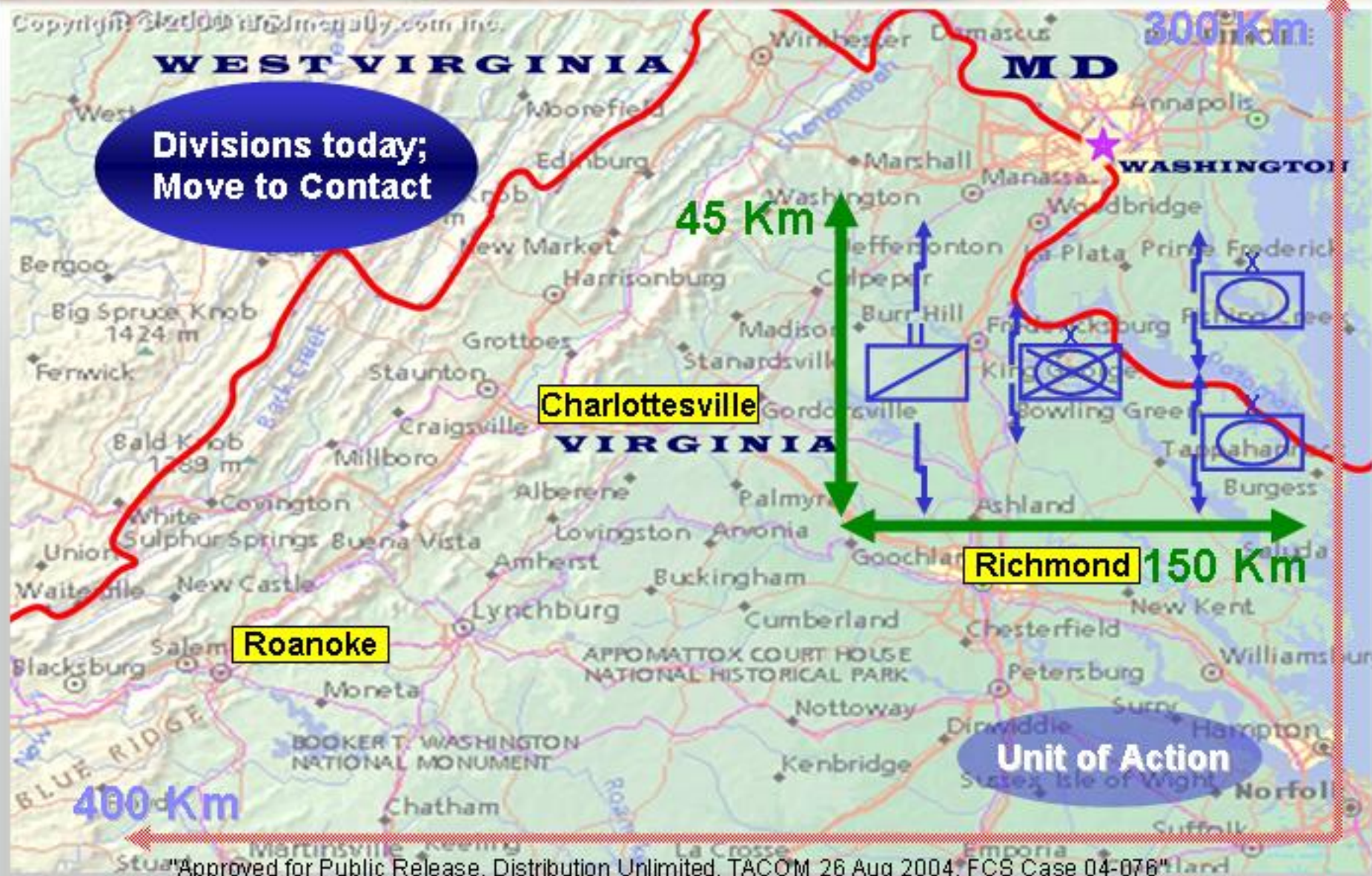
Network Enabled FCS-Equipped UAs are....

- Joint Interoperable
- Highly Mobile...
 - ✓ C-130 deployable
 - ✓ Ready to fight off the "ramp"
 - ✓ 72 hour self sustaining
- Able to maneuver out of contact...
 - ✓ Free to maneuver... no direct contact necessary
 - ✓ Optimizes indirect engagement... saves SOLDIERS' lives
 - ✓ Strike in the time and place of choosing
- Survivable and Lethal...
 - ✓ Massed Fires ... **NOT** Troops
 - ✓ Choice of direct / indirect / Joint precision munitions

Network Enabled FCS-Equipped UAs have....

- "Eyes-on-Target" through...
 - ✓ Networked Sensors
 - ✓ UAV / UGV / Unattended ground sensors
 - ✓ Organic / Joint / Coalition Assets
- Decentralized decision making...
 - ✓ Decision associates /aids
 - ✓ Single integrated battlefield picture

Current Force Movement to Contact

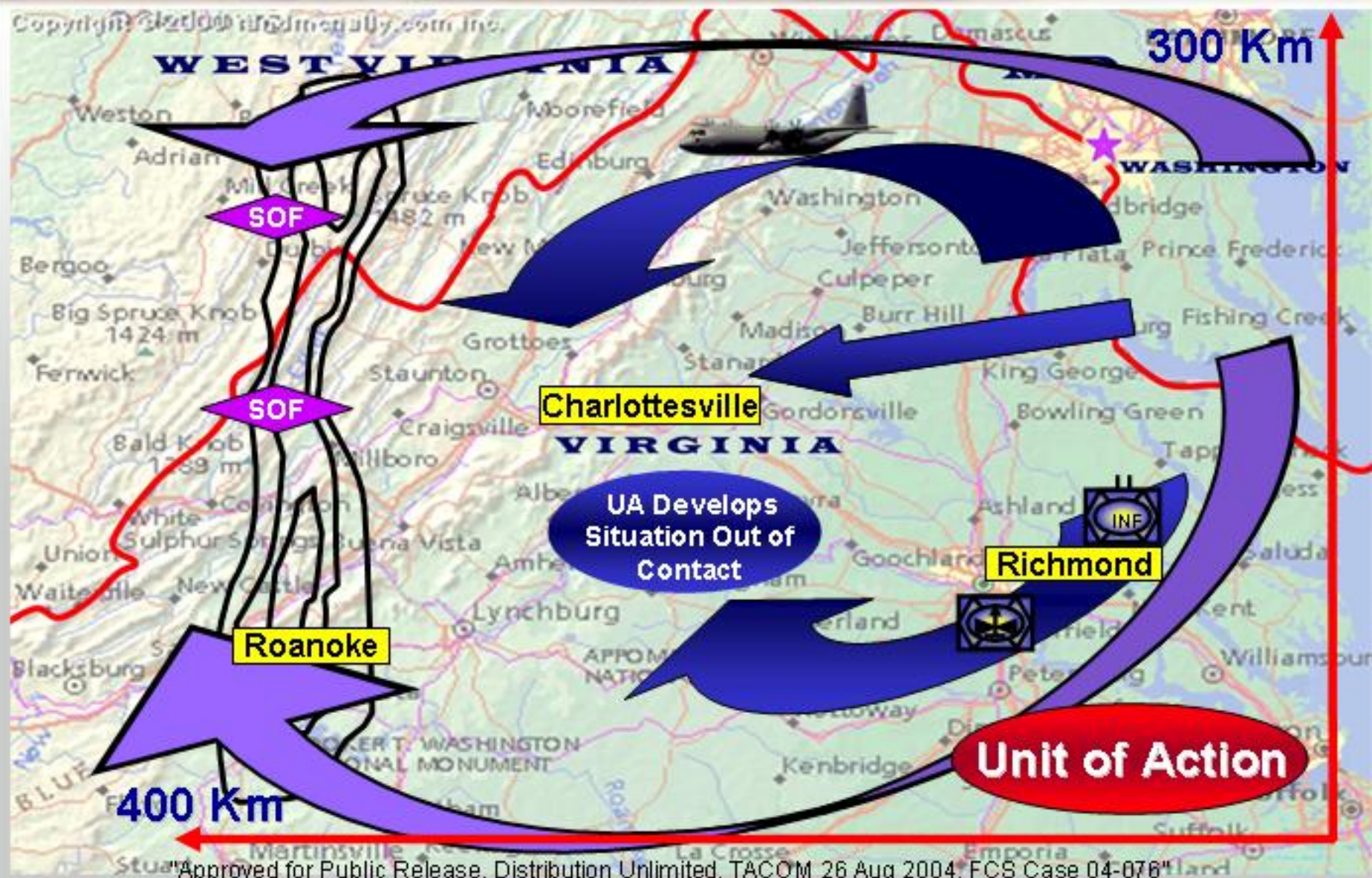


Future Force Maneuver "Out of Contact"

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An Integrated Family of Highly Capable Core Systems (Nodes)

FUTURE COMBAT SYSTEMS
FCS
One Team - The Army/Defense/Industry

Manned Systems

Infantry Combat Vehicle



Command & Control Vehicle



Mounted Combat System



Reconnaissance
and Surveillance



Non-Line-Of-Sight Mortar



Non-Line-Of-Sight Cannon



Soldier Systems



Maintenance
and Recovery



Medical Treatment
and Evacuation

Unmanned Air Platforms



Class I & II



Class III



Class IV

- Unmanned Payloads
- Unattended Ground Sensors

Unmanned Ground Vehicles



Armed Robotic Vehicle



MULE

- Unattended Munitions
 - NLOS-LS
 - Intelligent Munitions



Networked Battle Command

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FCS
One Team - The Army/Defense/Industry

Warfighter-Machine Interface (WMI) is optimized for human performance at 95% reliability and accuracy for:

- All networked warfare functions
- Unmanned vehicle control
- Operations on-the-move
- Extended high op-tempo operations
- Embedded training with "reach back"

WMI



SW displays are configured based on a soldier's role and permissions.



Driver:

360° FOV, augmented reality cues, engine status, speed, etc.

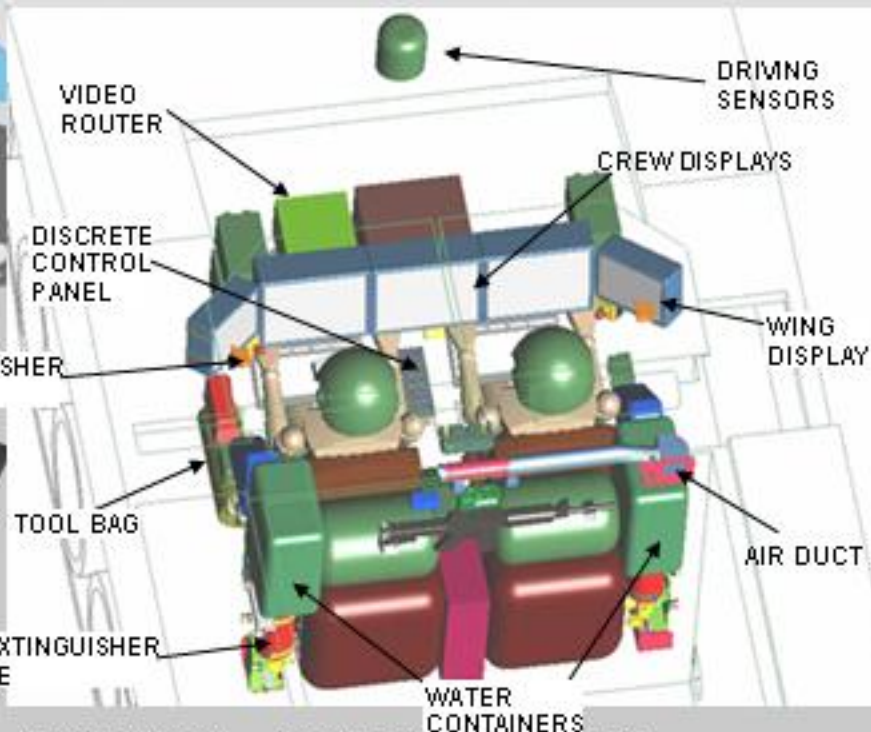
Commander:

3-D Map showing threat, friendly, terrain, targets, waypoints, targeting sensors, etc.

Middle screen:

Caution and warning system status, maintenance, backup displays

FIRE EXTINGUISHER
SENSORS



Networked Survivability

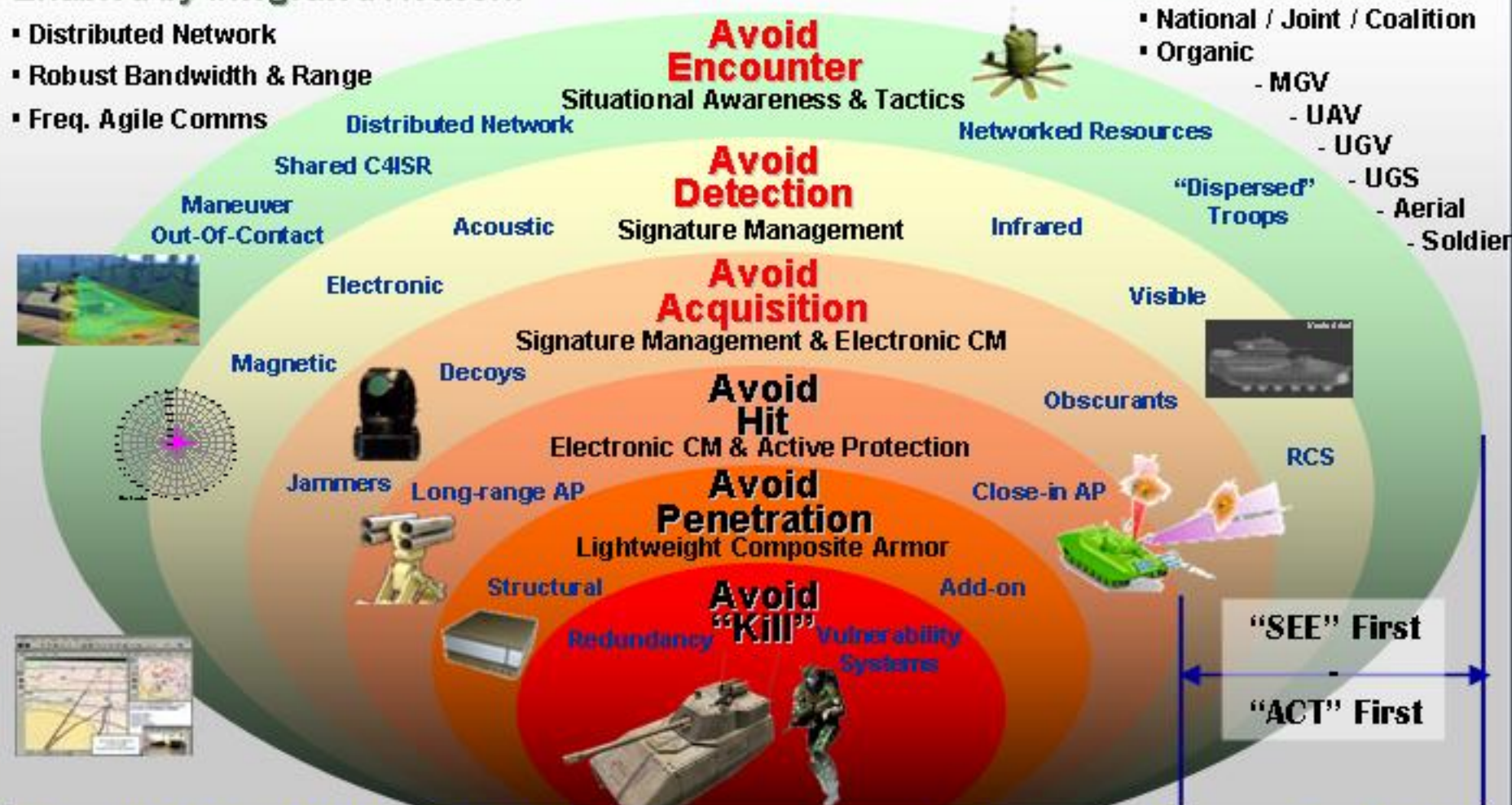
Enabled by Integrated Network

- Distributed Network
- Robust Bandwidth & Range
- Freq. Agile Comms

Distributed Sensors:

- National / Joint / Coalition
- Organic

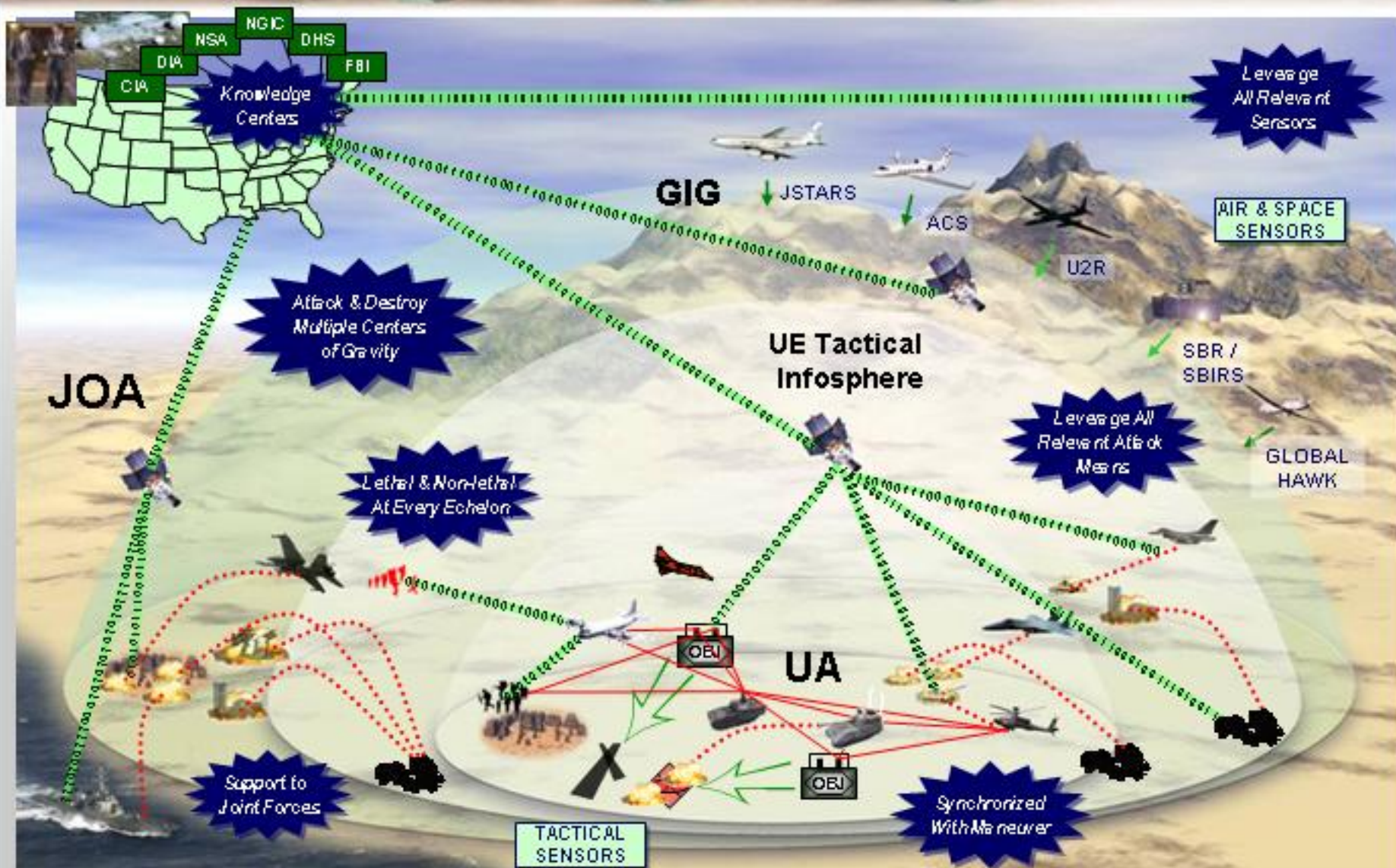
- MGCV
- UAV
- UGV
- UGS
- Aerial
- Soldier



Even if all else fails, the FCS platform is more survivable than current armored vehicles

Networked Lethality

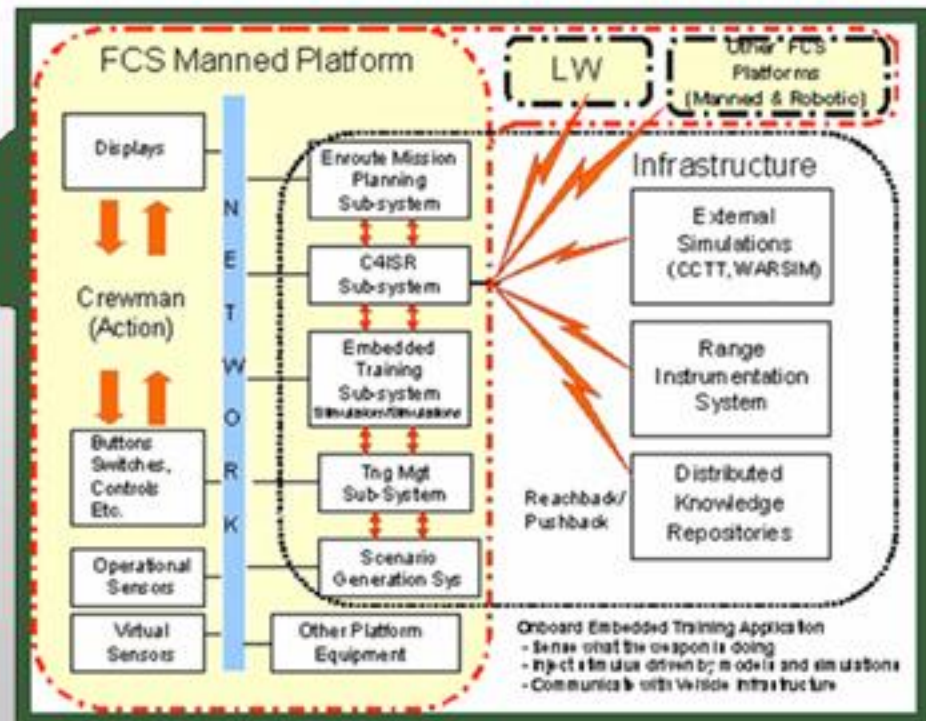
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Networked Training

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Objective: Train all individual, crew, collective and leader tasks using *embedded* training on their *assigned* (go to war) *vehicle*.... *Enroute Mission Rehearsal / Planning*...

Networked Supportability

Logistics Concept

- ✓ Network Enabled
 - ✓ Performance Based (PBL)
 - ✓ Distribution Based
 - ✓ Common Operating Picture
 - ✓ Anticipatory / Predictive / Reduced Footprint

Maintenance

- Substantially Increased Reliability and Availability
- Maximum Commonality of Components
- Common Electrical Connectors
- Prognostic / Diagnostic Sensors Integral to Platforms and Soldiers
- Immediate Access to Remove / Replace Modular Components
- Interactive Electronic Technical Manuals Embedded on Platforms



Water

- UA Generates its own Water



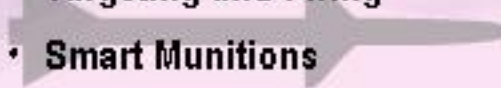
Fuel

- Lighter Vehicles
- Energy Efficient Drive Train



Munitions

- Networked Lethality – Targeting and Firing
- Smart Munitions



Lead Systems Integrator

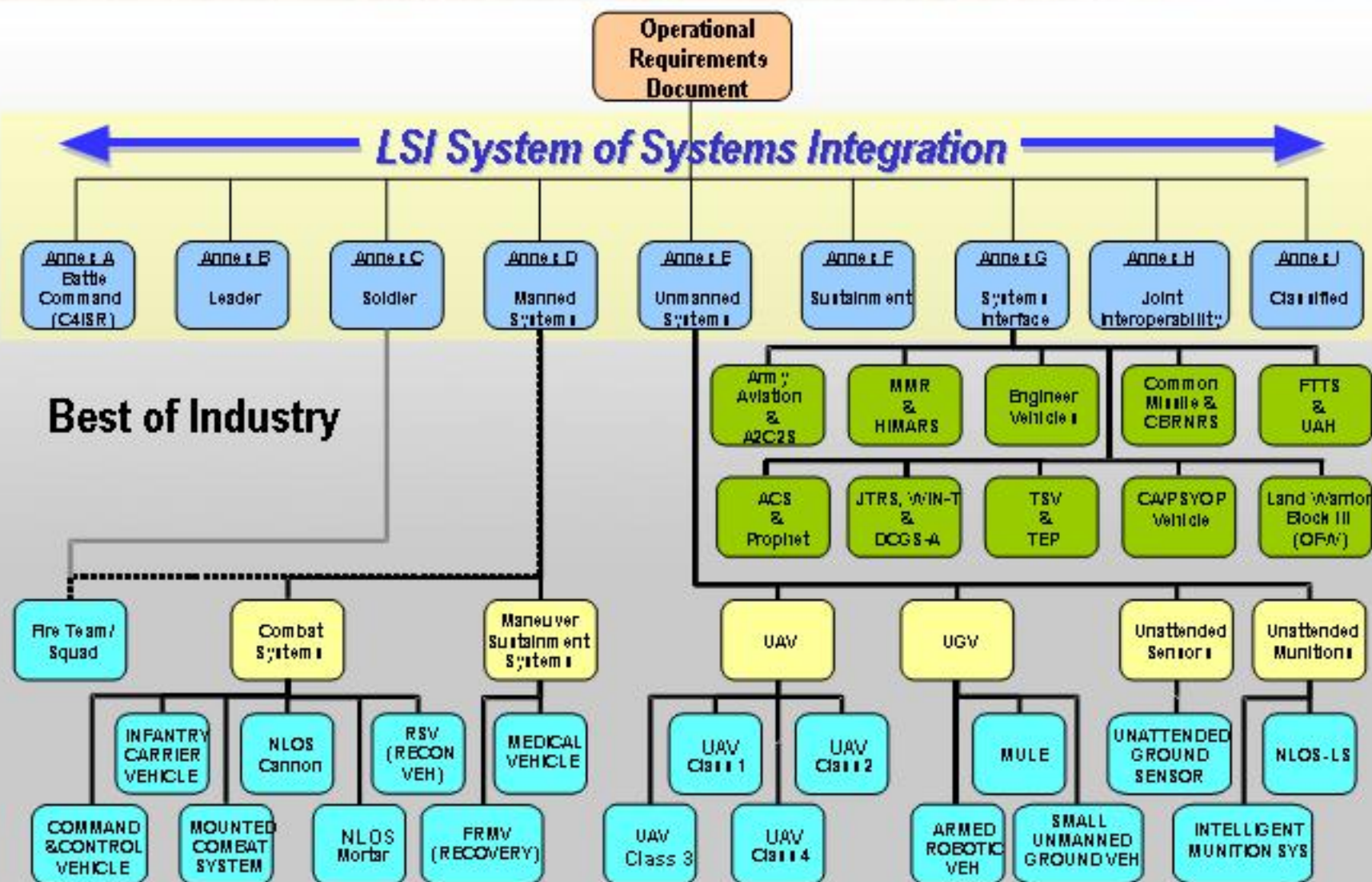
- **The Need...**

- Army's first large scale "system of systems" development
 - Organization experienced in large scale systems integration in order to be successful
 - To be integrated across many platforms, disciplines, and services
 - Requires a robust / dedicated organization

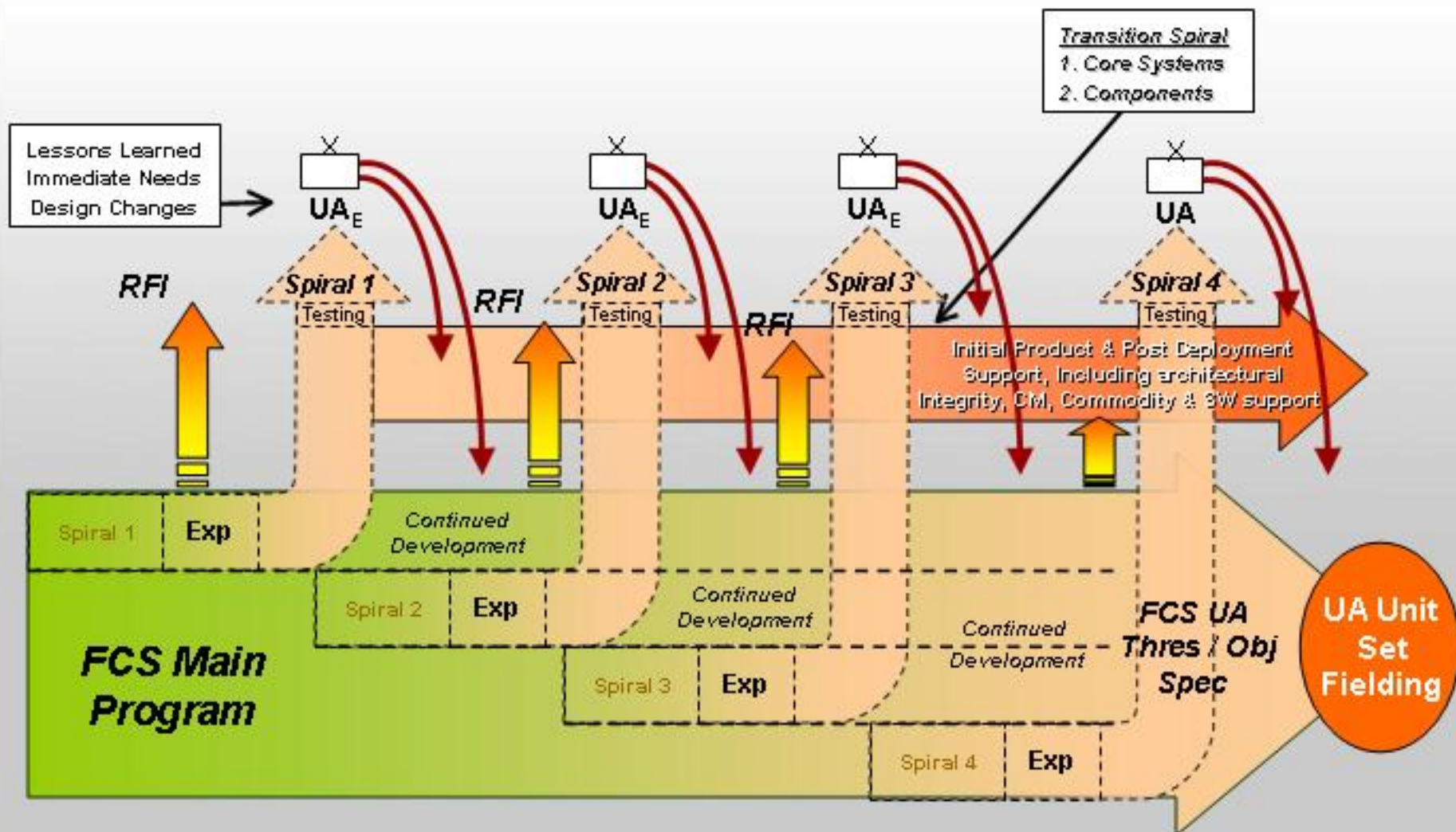
- **The Mission...**

- Executes total system of systems engineering, integration, simulation and testing
- Provides the FCS Team a "general contractor" for resource allocation, subcontract implementation, coordination, and programmatic responsibilities
- Provides the vital link to:
 - "Best of Industry" including domestic / foreign contractors
 - Government programs / labs
 - Educational institutions
 - Other Government agencies as required
- Cost effective / efficient - frees up "warfighting" assets

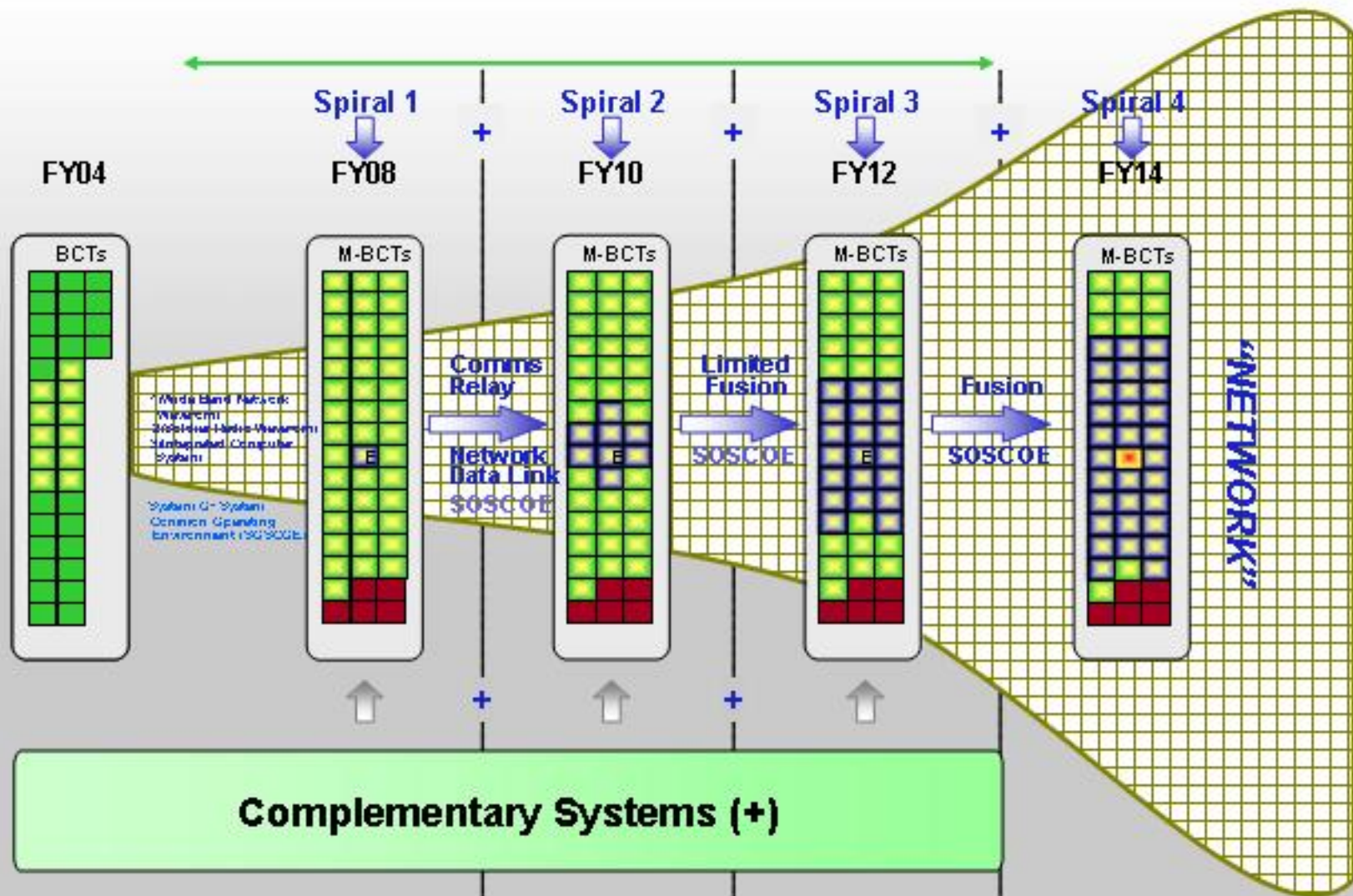
Program "System of Systems" Approach



FCS Spiral Development Concept

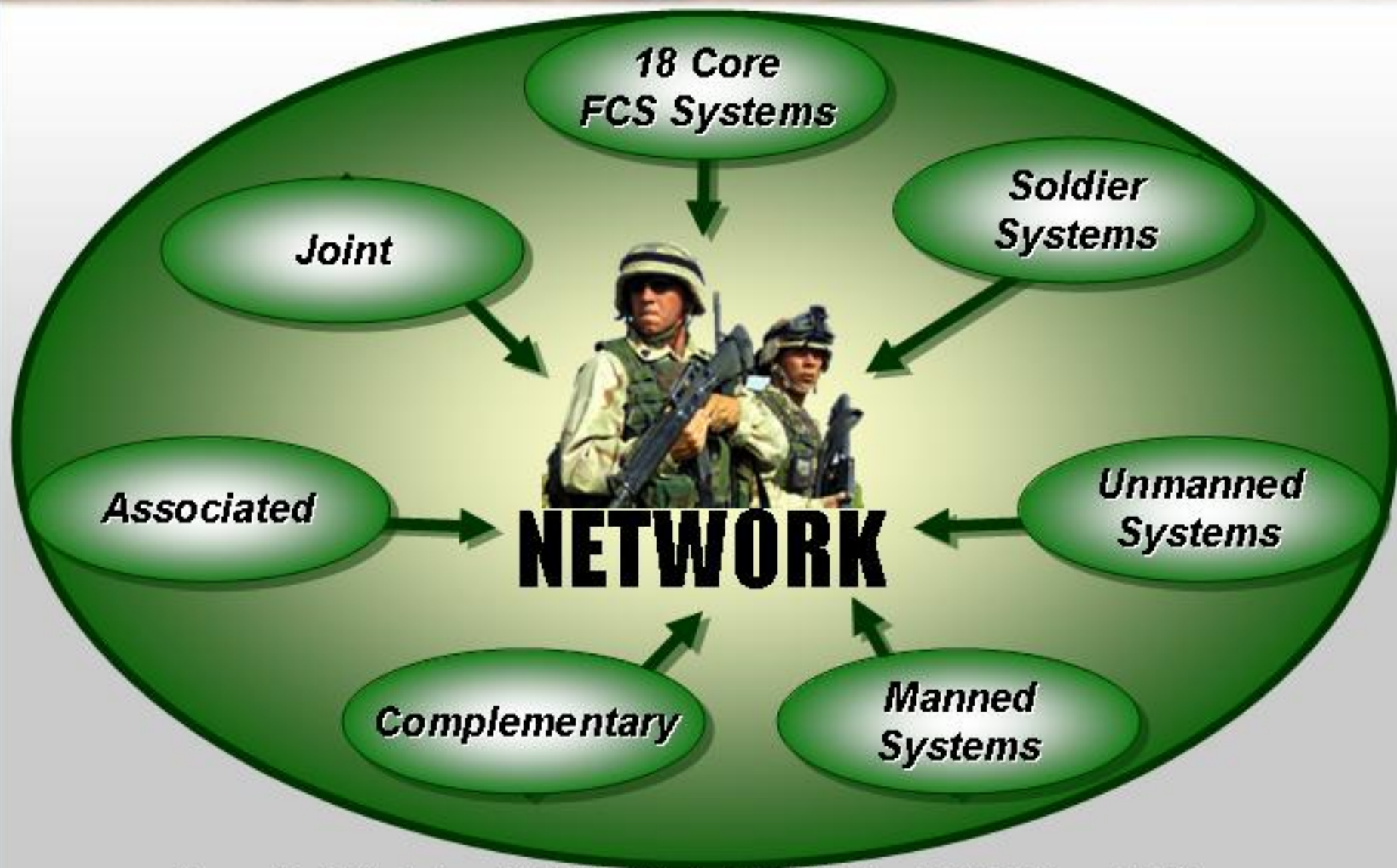


FCS Acceleration Strategy



Networked System of Systems "Greater Than The Sum of The Parts"

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Soldier Systems

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Provides overmatching operational capabilities to ground combatant Soldiers

All dismounted infantry wear the Land Warrior ensemble

- Fully integrates complete family of Soldier weapons systems
- Enhances survivability through improved body protection
- Embedded computer/communications system

Networked communications

- Synchronization of fires
- Implements networked lethality at the soldier level
- Report battle damage assessment
- Voice and data communications

Common operating picture

- Shows friendly positions, enemy positions, non-combatants and terrain
- Situational awareness (SA) provided by FCS network

Common operator control unit

- Control of unmanned assets
- Interface with LW equipped soldier



Unmanned Systems

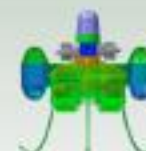
Class I Unmanned Air Vehicles (UAV)

Mission: Provides RSTA platoon level capability. ISR / SA / day-night / semi-autonomous / network node

Endurance: 50min over 8km area

Ceiling: 10,500ft MSL

Sensors: EO, Un-Cooled IR, provides targeting to 500m



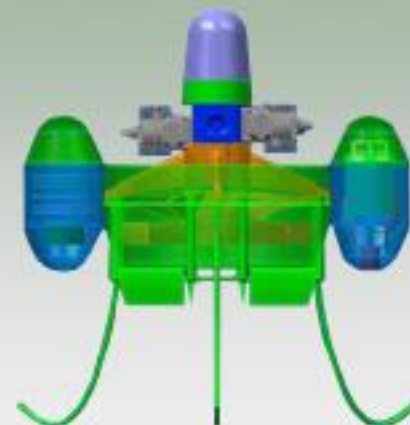
Class II Unmanned Air Vehicles (UAV)

Mission: Provides RSTA platoon/company level capability. ISR / SA / day-night / semi-autonomous / network node

Endurance: 120min over 16km area

Ceiling: 11,000ft MSL

Sensors: EO/IR with designation, provides targeting at a distance of 2 KM



Unmanned Systems (cont'd)

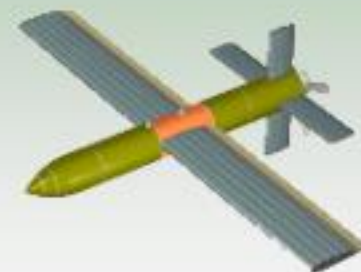
Class III Unmanned Air Vehicles (UAV)

Mission: Provides a multifunction aerial system capable of providing RSTA at battalion/brigade level. ISR / SA / day-night / network node

Endurance: 6 hr time on station at 40 km area

Ceiling: 12,000 ft MSL

Sensors: EO/IR/LD with mine detection and AiTR, SAR/GMTI, Acoustic



Class IV Unmanned Air Vehicle (Fire Scout)

Mission: Provides RSTA / target designation / emitter mapping / communications relay / CBRN detection and meteorological survey / network node

Endurance: 72 hours continuous operation (system)

Ceiling: 16,500ft MSL

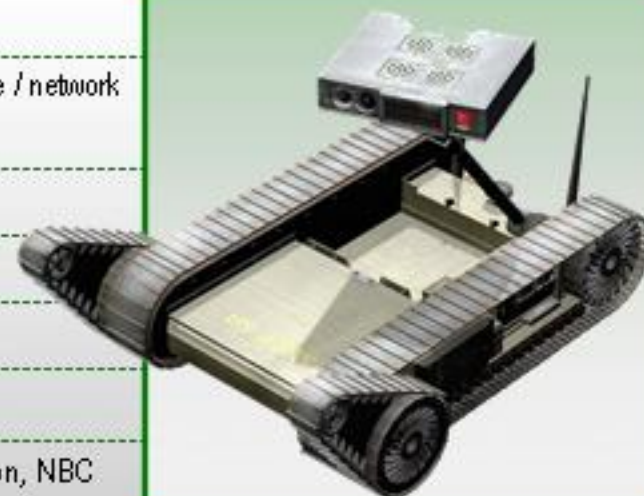
Sensors: EO/IR/LD CBRNE, Coms Relay, SAR/GMTI, Emitter Mapping, MET Survey, Acoustic



Unmanned Systems (cont'd)

Small Unmanned Ground Vehicle (SUGV)

Mission:	Provides extended reconnaissance of MOUT and subterranean battlespace / network node
Armament:	Non-Lethal specific to MOUT
Gross Weight:	30lbs
Endurance:	6hrs w/o recharge
Range:	1000m ground, 200m tunnel
Sensors:	Color/Monochrome EO, Un-cooled IR, Seismic, Acoustic, Target designation, NBC



Armed Reconnaissance Vehicle (ARV)

Mission:	Provides reconnaissance capability / over-watching LOS/BLOS fires / semi-autonomous / network node
Armament:	Joint Common Missile and Mk-44 30mm (Assault variant); FCS-common close support weapon (RSTA variant)
Gross Weight:	C-130 and CH-47 Transportable
Mobility:	Same as MGV
Range:	Greater than 400 km
Sensors:	Mast Mounted EO/IR/Laser, Multi-Function Ka-Band Radar, NBC



Unmanned Systems (cont'd)

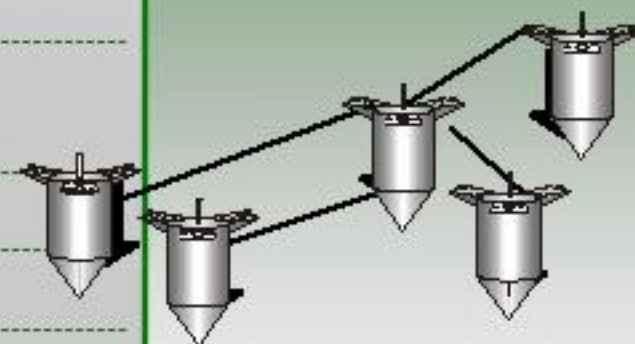
Unmanned Ground Vehicle (UGV)

Mission:	Multifunction Utility/Logistics and Equipment Vehicle (MULE) provides transport of equipment and/or supplies / capable of being armed in the role of support to dismounted infantry / network node
Gross Weight:	1 ton, C-130 Transportable
Payload:	Up to 2 tons cargo, electro-optical/infrared sensors, laser range finder/designator, and network nodes as required.
Range:	100km road, 50km cross country
Sensors:	Stand-off detection of AT Mines, IED, UXO, NBC



Unattended Ground Sensors (UGS)

Mission:	Provides modular and modifiable groups of sensors utilizing multiple ground sensing technologies / network node
Gross Weight:	No more that 25lbs (fit in MOLLE carrier)
Endurance:	48hr
Deployment:	Hand, robotic, vehicle
Sensors:	Monochrome EO, Un-Cooled IR, IR Trip Wire, Acoustic, Seismic, Magnetic



Manned Systems

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Command and Control Vehicle (C2V)

Crew: 2 + 4 staff

Mission: Provides battle command, control and communications for the Tactical Commander / network node

Armament: .50 Cal or Mk-19 40mm

Gross Weight: C-130 Transportable

Speed: 90kph

Range: 750km

Sensors: IICCD, Un-cooled LWIR, Multi-Function Ka-Band Radar, NBC



Reconnaissance and Surveillance Vehicle (R&S)

Crew: 2 + 4 Dismounted Scouts

Mission: Conducts streamlined acquisition, discrimination of multiple targets sets, and provides a dynamic hunter-killer capability / network node

Armament: .50 Cal or Mk-19 40mm

Gross Weight: C-130 Transportable

Speed: 90kph

Range: 750km

Sensors: Mast Mounted EO, Staring Dual-Color IR, Laser Imager, Optical Augmentation, Multi-Function Ka-Band Radar, NBC



Manned Systems (cont'd)

Infantry Combat Vehicle (ICV)

Mission:	Provides the mobility for 11 personnel (two-man crew and nine-man infantry squad) on the battlefield / network node
Crew:	2 + 9 Infantry
Armament:	Mk-44 30/40mm
GW:	C-130 Transportable
Speed:	90kph
Range:	750km
Sensors:	EO, LWIR, SWIR, Optical, multi-function Ka-Band radar, NBC



Mounted Combat System (MCS)

Crew:	2 + 2 passengers possible
Mission:	Provides offensive maneuver to close with and destroy enemy forces / network node
Armament:	.50 Cal MG, Mk-19 40 mm, 120mm Main Gun
GW:	C-130 Transportable
Speed:	90kph
Range:	750km
Sensors:	Un-cooled LWIR, IICCD, DVO, NVG, GPS/INS, NBC



Manned Systems (cont'd)

Non-Line-Of-Sight Cannon (NLOS-C)

Mission: Provides networked, extended-range targeting and precision attack of point and area targets in support of the UA / network node

Crew: 2

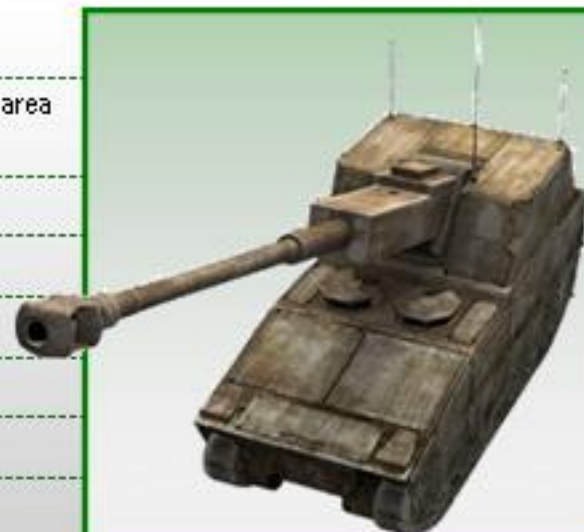
Armament: .50 Cal MG or Mk-19 40mm, TBD Main Gun

GW: C-130 Transportable

Speed: 90kph

Range: 750km

Sensors: Un-cooled LWIR, IICCD, DVO, NVG, GPS/INS, NBC



Non-Line-Of-Sight Mortar (NLOS-M)

Mission: Provides short-range indirect fires in support of assault battle units / network node

Crew: 4

Armament: .50 Cal MG or Mk-19 40mm, 120mm Mortar

GW: C-130 Transportable

Speed: 90kph

Range: 750km

Sensors: Un-cooled LWIR, IICCD, DVO, NVG, GPS/INS, NBC



Manned Systems (cont'd)

Medical and Evacuation Vehicle (MedEvac)

Crew: 4 + up to 4 litter patients

Mission: Manned Maneuver Sustainment Platform that provides the medical system within both the UA and UE. Has a common chassis with two types of interchangeable modules: Evacuation (MV-E) and Treatment (MV-T) / network node

GW: C-130 Transportable

Speed: 90kph

Range: 750km

Sensors: Un-cooled LWIR, IICCD, DVO, NVG, GPS/MNS, NBC



Maintenance and Recovery Vehicle (MRV)

Crew: 4 + 1 litter or 2 passengers

Mission: Manned Maneuver Sustainment Platform that provides the recovery and maintenance system within both the UA and UE / network node

GW: C-130 Transportable

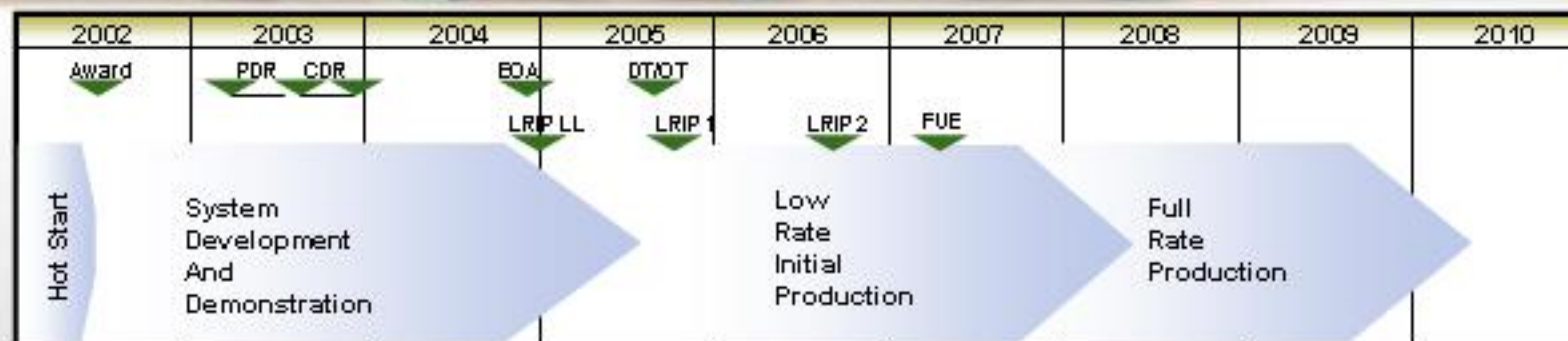
Speed: 90kph

Range: 750km

Sensors: Un-cooled LWIR, IICCD, DVO, NVG, GPS/MNS, NBC



Joint Tactical Radio System Cluster I



Surface - Air Domains

- Army, Air Force and Naval (USMC) Users
- Common components

Joint Wideband Network Waveform

- Ad Hoc Operation - Self-forming/healing/managed MANET
- Wideband, Anti-Jam, LPI/LPD, Bandwidth-efficient modes
- Wireless Internet-Like Services
- Spectrum Friendly Operation
- Transformational Security
- Global Information Grid Interoperability
- Network Management
- Quality of Service

23 Legacy Waveforms

- Link-16, UHFSATCOM, HF, EPLRS, SINCGARS, HaveQuick, VHF, UHF



Joint, Complementary & Associated Systems (Ground / Surface / Air)

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Future Combat Systems "One Team"

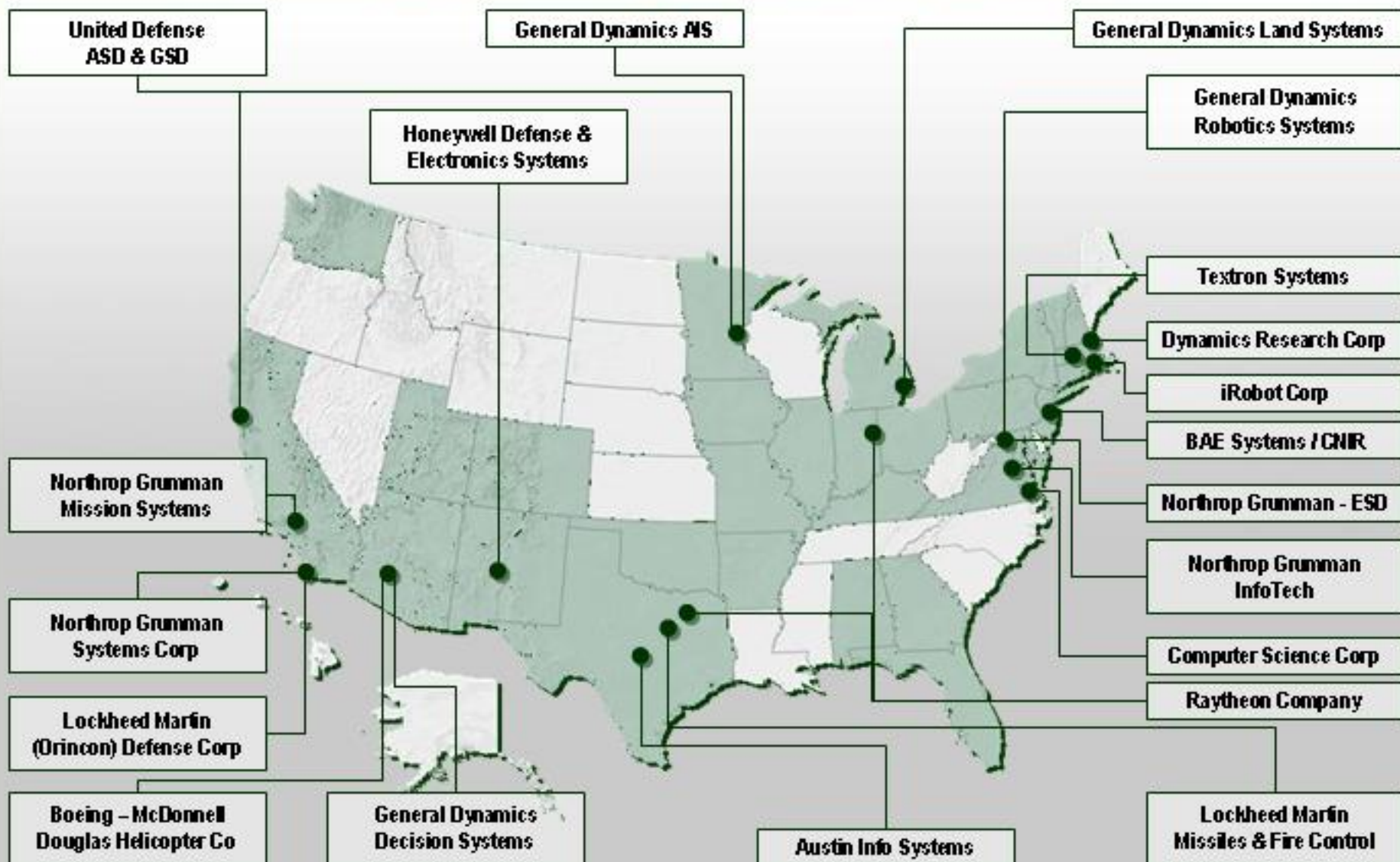
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Best of Industry

106 Congressional Districts in 29 States and Growing!

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